

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Hiddenori MORIYA et al.

Attn: PCT Branch

Application No. New U.S. National Stage of PCT/JP2004/010077

Filed: January 31, 2006

Docket No.: 126838

For: CONTROL DEVICE FOR INTERNAL COMBUSTION ENGINE AND METHOD  
FOR DETERMINING MISFIRE IN INTERNAL COMBUSTION ENGINE

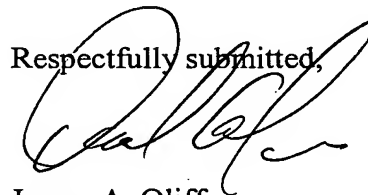
**TRANSLATION OF THE ANNEXES TO THE  
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Attached hereto is a translation of the annexes to the International Preliminary Report on Patentability (Form PCT/IPEA/409). The attached translated material replaces the claims in their entirety.

Respectfully submitted,



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## AMENDED PAGES

## CLAIMS

- 5           1. (After amendment) A control device for an  
internal combustion engine that generates power by  
burning an air-fuel mixture in a cylinder; comprising:  
          in-cylinder pressure detecting means;  
          calculating means that calculates a control  
10 parameter based on an in-cylinder pressure detected by  
the in-cylinder pressure detecting means and an in-  
cylinder volume at the time of detecting the in-  
cylinder pressure; and  
          misfire determining means that determines a  
15 misfire condition in the cylinder based upon the  
control parameter calculated by the calculating means,  
wherein:  
          the control parameter is a product of the in-  
cylinder pressure detected by the in-cylinder pressure  
20 detecting means and a value obtained by exponentiating  
the in-cylinder volume at the time of detecting the  
in-cylinder pressure by a predetermined index number;  
          the calculating means calculates the control  
parameters in two predetermined points; and  
25           the misfire determining means determines that an  
inside of the cylinder is in a misfire condition by  
comparing a difference component in the control

parameters between the two predetermined points with a predetermined threshold value.

2. (After amendment) The control device for the  
5 internal combustion engine according to claim 1,  
wherein:

the misfire determining means determines that the  
inside of the cylinder is in a half-misfire condition  
when the difference component in the control  
10 parameters between the two predetermined points is  
below a first threshold value.

3. (After amendment) The control device for the  
internal combustion engine according to claim 2,  
15 wherein:

when the misfire determining means determines  
that the inside of the cylinder is in the half-misfire  
condition, at least one of a throttle opening, a fuel  
injection quantity, an opened/closed timing of an  
20 intake valve or an exhaust valve, and an exhaust gas  
recirculating rate is corrected in such a way as to  
restrain a subsequent misfire.

4. (After amendment) The control device for the  
25 internal combustion engine according to claim 3,  
wherein:

the misfire determining means that the inside of

the cylinder is in a complete-misfire condition in a case where, after the correction is made for a predetermined time, the difference component in the control parameters between the two predetermined  
5 points is below the first threshold value and also below a second threshold value, which is smaller than the first threshold value.

5. (After amendment) The control device for the  
10 internal combustion engine according to claim 1, wherein:

one of the two predetermined points is set at a point after an intake valve opens and also before combustion starts, and the other is set at a point  
15 after the combustion starts and also before an exhaust valve opens.

6. (After amendment) A method for determining a misfire in an internal combustion engine that  
20 generates power by burning an air-fuel mixture in a cylinder comprising:

- (a) a step of detecting an in-cylinder pressure;
- (b) a step of calculating a control parameter based on the in-cylinder pressure detected in the step  
25 (a) and an in-cylinder volume at the time of detecting the in-cylinder pressure; and
- (c) a step of determining a misfire condition in

the cylinder based on the control parameter calculated in the step (b), wherein:

the control parameter to be calculated in the step (b) is a product of the in-cylinder pressure detected in the step (a) and a value obtained by exponentiating the in-cylinder volume at the time of detecting the in-cylinder pressure by a predetermined index number,

in the step (b), the control parameters are calculated in two predetermined points; and

in the step (c), it is determined that an inside of the cylinder is in a misfire condition by comparing a difference component in the control parameters between the two predetermined points with a predetermined threshold value.

7. (After amendment) The method for determining the misfire in the internal combustion engine according to claim 6, wherein:

in the step (c), it is determined that the inside of the cylinder is in a half-misfire condition when the difference component in the control parameters between the two predetermined points is below a first threshold value.

8. (After amendment) The method for determining the misfire for the internal combustion engine

according to claim 7, further comprising:

(d) a step of correcting at least one of a throttle opening, a fuel injection quantity, an opened/closed timing of an intake valve or an exhaust valve, and an exhaust gas recirculating rate in such a way as to restrain a subsequent misfire when it is determined in the step (c) that the inside of the cylinder is in the half-misfire condition.

10           9. (After amendment) The method for determining the misfire for the internal combustion engine according to claim 8, further comprising:

(e) a step of determining that the inside of the cylinder is in a complete-misfire condition in a case where after the correction in the step (d) is made for a predetermined time, the difference component in the control parameters between the two predetermined points is below the first threshold value and also below a second threshold value, which is smaller than the first threshold value.

10. (After amendment) The method for determining the misfire for the internal combustion engine according to claim 6, wherein:

25           one of the two predetermined points is set at a point after an intake valve opens and also before combustion starts, and the other is set at a point

after the combustion starts and also before an exhaust valve opens.

- 11. (Deletion)
- 5      12. (Deletion)
- 13. (Deletion)
- 14. (Deletion)